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मानक

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“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 11170 (1985): Performance Requirements for Constant Speed Compression Ignition (Diesel) Engines For Agricultural Purposes (Up to 20 kw) [TED 2: Automotive Primemovers]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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Indian Standard
**SPECIFICATION FOR
PERFORMANCE REQUIREMENTS FOR
CONSTANT SPEED COMPRESSION IGNITION
(DIESEL) ENGINES FOR AGRICULTURAL
PURPOSES (UP TO 20 kW)**

1. Scope — Lays down the performance requirements for Constant speed compression ignition (diesel) engines for agricultural purposes of rating up to 20 kW (IS Rating A of IS : 10000 (Part 4)-1980 Methods of tests for internal combustion engines: Part 4 Declaration of power, efficiency, fuel consumption and lubricating oil consumption).

1.1 This standard is not applicable to engines for tractors and to non-agricultural purpose engines, such as:

- a) Pressure-charged engines,
- b) Engines for propulsion or marine auxiliaries,
- c) Engines for aircraft propulsion or aircraft auxiliaries, and
- d) Engines for rail or road traction.

2. Definitions — As given in IS : 10000 (Part 1)-1980 'Methods of tests for internal combustion engines: Part 1 Glossary of terms relating to test methods', shall apply.

3. Tests — Shall be carried out to determine the performance of the engine. The tests may be carried out at the ambient conditions and the power and specific fuel consumption determined during the test shall be adjusted by using adjustment factors [see IS : 10000 (Part 4)-1980], if the ambient conditions are different from the standard reference conditions specified in Section 1 of IS : 10000 (Part 2)-1980 'Methods of tests for internal combustion engines: Part 2 Standard reference conditions'. For determining the performance, the following tests shall be carried out.

3.1 Type Tests — Shall be carried out on engines when first offered and shall also be carried out when there is any functional change in the design of the engine or functional change(s) in the design of any of the critical component(s) given in 3.1.1. Type tests shall include:

- a) Preparation for tests according to IS : 10000 (Part 5)-1980 'Methods of tests for internal combustion engines: Part 5 Preparation for tests and measurements for wear';
- b) Preliminary run according to IS : 10000 (Part 5)-1980;
- c) Initial performance test according to Section 1 of IS : 10000 (Part 8)-1980 'Methods of tests for internal combustion engines: Part 8 Performance tests';
- d) Endurance test according to Section 1 of IS : 10000 (Part 9)-1980 'Methods of tests for internal combustion engines: Part 9 Endurance tests';
- e) Final performance test according to Section 1 or IS : 10000 (Part 8)-1980;
- f) Final inspection test according to IS : 10000 (Part 6)-1980 'Methods of tests for internal combustion engines: Part 6 Recording of test results'; and
- g) Lubricating oil consumption according to IS : 10000 (Part 4)-1980.

3.1.1 In case any functional change (see 3.1.1.1 and 3.1.1.2) in the design of the following critical components of the engine is made, the type test shall be carried out again:

- a) Cylinder head;
- b) Crank case;
- c) Cylinder block;
- d) Cylinder liner;

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Gr 2

- e) Inlet and exhaust valves;
- f) Valves guides;
- g) Rocker arms;
- h) Tappets;
- i) Piston;
- k) Piston rings;
- m) Gudgeon pin;
- n) Connecting rod;
- p) Crankshaft;
- q) Main bearings;
- r) Big end bearing and small end bearing/bush for connecting rod;
- s) Connecting rod bolts and nuts;
- t) Camshaft, cams and timing gears;
- u) Valve springs, and governor springs (wherever applicable);
- v) Fuel injection equipment, such as fuel injection pump, injector nozzle and high pressure pipe;
- w) Lubricating oil pump;
- y) Cylinder head gasket; and
- z) Governor weights.

3.1.1.1 Any change in the design of a component which may either effect the other mating components, or the performance or operation of the engine, shall be considered a functional change.

Examples

- a) change in the bore dimension of the bearing, and
- b) change in the bore of liner.

3.1.1.2 Style changes shall not be considered a functional change.

3.1.2 In case of re-declaration of rated power output and/or speed, where new declaration(s) are higher than the previous value(s) a re-type test shall be required. In case the engine is derated either for power output or speed or both without any change in the components or the design of the engine, only the initial performance test according to IS : 10000 (Part 8)-1980 shall be required.

3.2 In case of re-declaration of specific fuel consumption a re-type test shall be required.

3.3 Power of the engine shall be declared according to Section 1 of IS : 10000 (Part 4)-1980 and shall be determined during the final performance test.

3.4 Mechanical efficiency requirements shall be in accordance with 6 of IS : 10000 (Part 4)-1980.

3.5 After the engines have been type tested, the engines of similar design shall be subjected to initial performance test according to Section 1 of IS : 10000 (Part 8)-1980.

4. Performance Requirements of Engines

4.1 Power — The power of the engine shall be declared in kW.

4.1.1 The power determined in 3.3 shall not be less than 1 percent of the declared value.

4.2 Specific Fuel Consumption — Of engines varies with speed, type of fuel injection and methods of cooling, and shall have the following values:

<i>Rated Engine Speed (rev/min)</i>	<i>SFC, Max (g/kWh)</i>
a) Direct injection engines:	
Up to 1 000	241
Above 1 000 up to 2 000	252
Above 2 000 (water cooled)	282
Above 2 000 (air cooled)	309
b) Indirect injection engines:	
Up to 1 000	268
Above 1 000 up to 2 000	252
Above 2 000 (water cooled)	282
Above 2 000 (air cooled)	309

4.2.1 SFC of the engine after the endurance test specified in Section 1 of IS : 10000 (Part 9)-1980 shall not increase by more than 5 percent of the value obtained after the initial performance test specified in Section 1 of IS : 10000 (Part 8)-1980.

4.3 Lubricating Oil Consumption — Observed in accordance with IS : 10000 (Part 4)-1980 shall not exceed declared value by more than 10 percent.

4.4 Governing — The engine shall meet the requirements of class B1 governing in accordance with 2.3.3 of IS : 10000 (Part 7)-1980 'Methods of tests for internal combustion engines: Part 7 Governing test for constant speed engines and selection of engines for use with electrical generators'.

5. Test Results — Shall be recorded according to IS : 10000 (Part 6)-1980 except that during the fuel consumption test, the observations shall be made every 15 minutes subject to thermal stabilization of the engine. Performance curves shall also be plotted according to IS : 10000 (Part 6)-1980.

5.1 Measurements for testing, Units and Limits of Accuracy — Shall be according to IS : 10000 (Part 3)-1980 'Methods of tests for internal combustion engines: Part 3 Measurements for testing—units and limits of accuracy'.

6. Information for Inquiry or Order and Information to be Supplied by the Manufacturer — Shall be according to IS : 10000 (Part 11)-1980 'Methods of tests for internal combustion engines: Part 11 Information required with inquiry or order and information supplied by the manufacturer with the engine'.

7. Marking — The engine shall be clearly marked with the following:

- Rated output in kW,
- Rated speed in rev/min,
- Specific fuel consumption (SFC) in g/kWh, and
- Manufacturer's name or trade-mark and code number.

7.1 ISI Certification Marking — Details available with the Indian Standards Institution.

8. Test Certificate — Shall be provided by the testing authority in the manner prescribed for the purpose [see IS : 10000 (Part 12)-1980 'Methods of tests for internal combustion engine: Part 12 Test certificate'].

9. Packing — The engines shall be suitably packed so as to avoid damage during transit.

E X P L A N A T O R Y N O T E

As a result of experience gained by implementation of IS : 10000 series of standards on diesel engines, a need was felt to have a separate standard for diesel engines for agricultural applications.

In this standard, values for specific fuel consumption have been specified on the basis of type of injection of fuel and cooling method in addition to the speed range. It also specifies the nature of tests required on derated version of an engine.

For other requirements, this standard is in general agreement with IS : 10001-1981 'Performance requirements for constant speed compression ignition (diesel) engines for general purposes (up to 20 kW)'.

AMENDMENT NO. 2 MAY 1999
TO
IS 11170 : 1985 SPECIFICATION FOR
PERFORMANCE REQUIREMENTS FOR CONSTANT
SPEED COMPRESSION IGNITION (DIESEL) ENGINES
FOR AGRICULTURAL PURPOSES (UP TO 20 kW)

(Page 2, clause 4.1.1) — Substitute the following for the existing:

'4.1.1 The power determined in 3.3 shall not be less than 97 percent of the declared value.'

(Page 3, clause 4.2) — Substitute the following for the existing:

'4.2 *Specific Fuel Consumption (SFC)* -- Of engines varies with speed, type of fuel injection and methods of cooling and shall have the following values:

<i>Rated Engine Speed</i> (rev/min)	<i>SFC, Max</i> (g/kWh)			
	<i>Direct Injection</i>		<i>Indirect Injection</i>	
	<i>Air cooled</i>	<i>Water cooled</i>	<i>Air cooled</i>	<i>Water cooled</i>
Up to 1 000	272	248	294	268
Above 1 000 up to 2 000	276	252	276	252
Above 2 000	309	282	309	282

(HMD 19)

**AMENDMENT NO. 3 MAY 2002
TO
IS 11170 : 1985 SPECIFICATION FOR PERFORMANCE
REQUIREMENTS FOR CONSTANT SPEED
COMPRESSION IGNITION (DIESEL) ENGINES FOR
AGRICULTURAL PURPOSES (UP TO 20 kW)**

(Page 2, clause 3.5) — Insert the following new clause after 3.5:

3.6 Routine Production Acceptance Test

3.6.1 For routine production acceptance test, the rating test shall be of 8-hour duration on a well-run-in engine as per details given below.

3.6.1.1 Engine of IS rating A — Seven hours of continuous run at rated full load at the rated speed to be followed immediately by one hour run at 10% overload as specified in IS 10000 (Part 4) : 1980.

3.6.1.2 Engine of IS rating B — Eight hours of continuous run at the rated speed and rated full load without subjecting the engine to any overload as specified in IS 10000 (Part 4) : 1980.

3.6.2 The fuel consumption test shall be done as per 2.1.3(b) of IS 10000 (Part 8) : 1980.

3.6.3 The governing test shall be done as per IS 10000 (Part 7) : 1980.

3.6.4 The fuel consumption test and governing test shall be carried out only after the eight-hour rating test has been completed. The sequence of fuel consumption test and governing test may be interchanged depending on the convenience for testing.

(TED 9)

AMENDMENT NO. 4 DECEMBER 2005
TO
IS 11170 : 1985 SPECIFICATION FOR
PERFORMANCE REQUIREMENTS FOR CONSTANT
SPEED COMPRESSION IGNITION (DIESEL) ENGINES
FOR AGRICULTURAL PURPOSES (UP TO 20 kW)

(*Page 1, clause 3.1.1, first sentence*) — Substitute the following for the existing:

'3.1.1 In case any functional change in the design of the following critical components of the engine is made, the test shall be carried out according to IS 10000 (Part 13) : 2002:'

(TED 2)

**AMENDMENT NO. 5 NOVEMBER 2010
TO
IS 11170 : 1985 SPECIFICATION FOR
PERFORMANCE REQUIREMENTS FOR
CONSTANT SPEED COMPRESSION IGNITION (DIESEL)
ENGINES FOR AGRICULTURAL PURPOSES
(UP TO 20 kW)**

(Page 1, Title) — Substitute ‘(UP TO 19 kW)’ for ‘(UP TO 20 kW)’.

(Page 1, clause 1, line 2) — Substitute ‘up to 19 kW’ for ‘up to 20 kW’.

(TED 2)

Reprography Unit, BIS, New Delhi, India